DOCUMENT RESUME

ED 425 918 SE 061 915

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TITLE Music Training and Mathematics Achievement of Ninth Graders.
PUB DATE 1998-10-13
NOTE 5p.
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Grade 9; *Mathematics Achievement; *Mathematics Education; *Music Education; Secondary Education

ABSTRACT

Iowa Test of Basic Skills (ITBS) mathematics scores of ninth graders (N=113) who had received music lessons were compared according to whether the students were given private lessons. Comparisons were also made between students whose lessons were on the keyboard and students whose lessons involved something other than the keyboard. Students who had private lessons for two or more years performed significantly higher on the composite mathematics portion of the ITBS than those students who did not have private lessons. Students whose lessons involved the keyboard had significantly higher ITBS mathematics scores than those students whose lessons did not involve the keyboard. These results are discussed in relation to previous research on music training and mathematics achievement. (Author)

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Music Training and Mathematics Achievement of Ninth Graders

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ABSTRACT

ITBS mathematics scores of ninth graders (n = 113) who had received music lessons were compared according to whether the students were given private lessons. Comparisons also were made between students whose lessons were on the keyboard and students whose lessons involved something other than the keyboard. Students who had private lessons for two or more years performed significantly higher on the composite mathematics portion of the Iowa Tests of Basic Skills (ITBS) than did students who did not have private lessons. Students whose lessons involved the keyboard had significantly higher ITBS mathematics scores than did students whose lessons did not involve the keyboard. These results are discussed in relation to previous research on music training and mathematics achievement.

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Music Training and Mathematics Achievement of Ninth Graders

Numerous studies have focused on the relationship between the degree of training a youngster has in music and the achievement level of that youngster. For example, Nisbet (1991) claimed that there is a close relationship between the musical symbolism used in setting the time signature and mathematical symbolism used to represent fraction concepts. Wenger and Wenger (1990) reported evidence that some neuroscientists suspect that, when children exercise cortical neurons by being actively involved in music, they are also making the circuits used for mathematics stronger, and that they are improving their spatial reasoning skills and are better able to handle complex reasoning tasks. Other studies (e.g., Rayl, 1995; Martin, 1995) reported similar findings in that adolescents with formal training in music tend to achieve higher in mathematics than adolescents with no formal training in music. Other research (e.g., Shaw, Rauscher, Levine, Wright, Dennis, & Newcomb, 1997; Fisher & O'Malley, 1997) indicates that students whose music training involves the keyboard tend to achieve higher in mathematics than do students whose music training does not involve the keyboard.

The purpose of the present study was to examine the types of training adolescents receive in music and to determine if significant relationships exist between the types of training and the students' mathematics achievement levels. A total of 113 ninth graders were involved in the study. All 113 of the students received music lessons at school, 36 of them also had private music lessons, and 77 of them did not have private music lessons. All 113 of the students had taken the ITBS near the end of their eighth grade year. They were surveyed about the status of their music training early in the ninth grade year. The survey asked for the type of instrument(s) for which students received lessons (voice lessons were included as a type of training), whether private lessons were received, the number of years students had music lessons at school, the number of years students had private lessons, and demographics such as the gender of the respondents.

Results

A total of 45 males and 68 females were included in the analysis. No significant difference was found between the ITBS mathematics scores of males and the ITBS mathematics scores of females. Of the 45 males, 13 had received private music lessons. Of these 13 males, 3 had keyboard lessons and 10 had music lessons on instruments other than the keyboard. Of the 68 females, 23 received private lessons. Of these 23 females, 17 had keyboard lessons and 6 had lessons other than the keyboard.

The ITBS mathematics scores of the 36 students who received private lessons were compared to the ITBS mathematics scores of the 77 students who did not receive private lessons. No significant difference was found between the two sets of scores. However, 20 of the 36 students who received private lessons had these lessons for 2 or more years, and a comparison of the scores of these 20 students to the scores of the 77 students who had no private lessons yielded a significant difference in favor of the 20 students ($t = 5.72$, $p < .001$).

Of the 77 students whose music lessons were all at school, 25 had school lessons for fewer than 2 years and 52 had school lessons for more than two years. No significant difference was found between the ITBS mathematics scores of the 25 students with fewer than 2 years of lessons and the ITBS mathematics scores of the 52 students with more than 2 years of lessons.

Analyses of the types of instruments for which students received lessons resulted in one significant finding. For the 36 students who received private lessons, 20 received keyboard lessons and 16 had lessons other than the keyboard. The 20 students who received keyboard lessons had significantly higher ITBS mathematics scores than did the 16 students who had lessons other than the keyboard ($t = 3.60$, $p < .01$).

In summary, this study supports the hypothesis that mathematics achievement is enhanced by music training, provided the training is for an extended length of time (two or more years) and provided the music lessons are private. The reasons why the private lessons and the school lessons yielded significantly higher achievement than did school lessons only can only be conjectured. It may be that the combination of private lessons and school lessons provides a degree of exposure that reaches a threshold at which maximum benefit is attained. It may be that affluence plays a role in this phenomenon, such that more affluent families were more willing to

pay for private lessons, although a cursory examination of the students involved did not seem to indicate that this was the case.

The study also indicates that keyboard instruction tends to be related to mathematics achievement more so than music instruction of other types. This supports the works of Fisher and O'Malley (1997) and of Shaw et al. (1997).

Due to the small sample of the present study, replications with larger samples should be conducted. If possible, groups of students who receive private music lessons (but no music lessons at school) should be examined also. This could answer the question of whether private music lessons (without any school music lessons) tend to optimally enhance mathematics achievement or whether the combined experience of private lessons and school lessons are most beneficial.

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